0053755

Meeting Minutes Transmittal/Approval
Unit Managers' Meeting
200 Area Groundwater and Source Operable Units
3350 George Washington Way, Richland, Washington
February 2000

082094

APPROVAL: Bryan S. Foley Date 8/10/00
Bryan Foley, 200 Area Unit Manager, RL (A5-13)

APPROVAL: Brenda L Becker-Khaleel Date 8/28/00
~~Wayne Soper~~, 200 Area Unit Manager, Ecology (B5-18)
Brenda Becker-Khaleel

APPROVAL: Dennis Faulk Date 9-5-00
Dennis Faulk, 200 Area Unit Manager, EPA (B5-01)

APPROVAL: Arlene C. Tortoso Date 8/14/00
Arlene Tortoso, Groundwater Unit Manager, RL (H0-12)

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Meeting minutes are attached. Minutes are comprised of the following:

Attachment 1	--	Agenda
Attachment 2	--	Attendance Record
Attachment 3	--	200 Area UMM Minutes – February 2000
Attachment 4	--	200-TW-1 & 200-TW-2 DQO Schedule
Attachment 5	--	Background of the 200-PW-2 Uranium-Rich Process Waste Group Operable Unit
Attachment 6	--	Radionuclide Results of the S Pond Characterization Activity
Attachment 7	--	Preliminary Cost Estimates for Partitioning Interwell Tracer Tests to Characterize Carbon Tetrachloride DNAPL Beneath Z-9 Crib, Hanford Reservation, Washington
Attachment 8	--	200-ZP-2 Passive Soil Vapor Extraction Granular Activated Carbon Analyses
Attachment 9	--	Listed Waste – F003 (Methanol)

Prepared by: Chloe Brewster Date 6/22/00
Chloe Brewster (HO-19)

Concurrence by: Bruce Ford Date 6/19/00
Bruce Ford, BHI Groundwater/Vadose Zone Integration (H0-19)

UNIT MANAGERS' MEETING AGENDA

3350 George Washington Way
February 23, 2000

<u>8:00 – 10:00 a.m.</u>   <u>200 Area</u>   <u>Room1B45</u>

- 200-CW-1 Gable/B Pond and Ditches Cooling Water OU (20 minutes)
  - Work Plan Status
  - Status on re-certification of 216-B-3 Pond TSD Unit Part A
  - TPA Change Package Status
  - Characterization Activities Status
  - Status on Contained-in Determination
  - Hydrazine Sampling of IDW Approach
- 200-CW-5 U Pond/Z Ditches Cooling Water OU (5 minutes)
  - Work Plan Status
  - Integration with Science and Technology Project Needs
- 200-TW-1 Scavenged and 200-TW-2 OUs (5 minutes)
  - DQO Status
- 200-PW-2 Uranium-Rich Process Waste Operable Unit (5 minutes)
  - Schedule
- S200-CS-1 Chemical Sewer OU (10 minutes)
  - Work Plan Status
  - Status S Pond Characterization Activity
  - 216-B-63 Trench RCRA TSD Inspection Frequency Change

- General Topics: (5 minutes)
  - Annual Re-Evaluation of Operable Unit Prioritization

  - Status on Activities at Hanford Prototype Surface Barrier

- 200-UP-1 (5 minutes)
  - Status Update

- 200-ZP-1 (5 minutes)
  - Status Update

- 200-ZP-2 (20 minutes)
  - ITRD Update

  - Status FY00 Monitoring and Operational Plans

082094

Attachment 2

200 Area Unit Mangers' Meeting
February 23, 2000
8:00 a.m. – 10:00 a.m.
3350 George Washington Way, Conference Room 1B-45

ATTENDEE	ORGANIZATION	PHONE NUMBER
Virginia Rohay	CHI	372-9100
Arlene Tortoso	DOE	373-9631
Dennis Faulk	EPA	376-8631
Craig Cameron	EPA	376-8665
Bruce Ford	BHI	372-9242
Chris Cearlock	CHI	372-9574
Mary E. Todd	CHI	372-9030
Brenda Becker-Khaleel	Ecology	736-3003
Zelma Jackson	Ecology	736-3024
Garrett Day	BHI	

MEETING MINUTES
200 AREA GROUNDWATER AND SOURCE OPERABLE UNITS
UNIT MANAGERS' MEETING --200 AREA
February 23, 2000

Agenda: ***See Attachment #1b.***

Attendees: **See Attachment #2b.**

Topics of Discussion:

1. 200-CW-1 Gable/B Pond and Ditches Cooling Water Operable Unit (OU) – It was reported by Bruce Ford (Bechtel Hanford, Inc. [BHI]) that Bryan Foley (U.S. Department of Energy, Richland Operations Office [RL]) will be setting up a separate meeting with Ted Wooley (Washington State Department of Ecology [Ecology]) to resolve OU issues such as the Part A revision, the TPA change package, and the waste control plan. Resolution of these issues will support finalization of the revision 0 work plan.

   TPA change package status was deferred to the next meeting.

   Characterization activity status was deferred to the next meeting.

   Hydrazine sampling of 200-CW-1 waste drums will be done during the week of March 7 to support a request for a contained-in determination for the IDW.

2. 200-CW-5 U Pond/Z Ditches Cooling Water OU – It was reported that the review of the work plan ended 1/31, but was extended until 2/10 to accommodate Doug Sherwood's (U.S. Environmental Protection Agency [EPA]) review; however, due to Doug's absence from the office, the review has not been completed. Dennis Faulk (EPA) stated that Doug was working toward a February 25 due date for the comments, but would not likely be finished. It was suggested that Bryan Foley (RL) send Doug Sherwood a message identifying the critical path and requesting an expedited review.

   Bruce Ford (BHI) discussed an integration meeting with John Zachara (PNNL) of the Science and Technology (S&T) Project. They are interested in evaluating transport of plutonium and are going to submit a proposal for integrated activities with 200-CW-5, 200-TW-2 and 200-PW-1. Dennis Faulk (EPA) suggested writing a test plan.

3. 200-TW-1 Scavenged and 200-TW-2 Tank Waste OUs – During the February 17 data quality objectives (DQO) meeting, the regulators requested additional information on the representative sites and an evaluation of the T Plant sites as representative sites. This is to be provided to EPA and Ecology by 2/25. The **DQO schedule** was provided. The strawman (DQO workbook) is currently in preparation. One of the next activities will be the external DQO meeting on 4/6. Dennis Faulk (EPA) thought EPA may not need to attend as it is not part of their protocol and they don't approve summary reports. Mary Todd (CH2M Hill, Hanford, Inc. [CHI]) will follow up on the location of materials sent to Zelma Jackson (Ecology) as she hadn't received them as of 2/22. Zelma is to complete her review of the materials by 3/2.

4. 200-PW-2 Uranium-Rich Process Waste Operable Unit – A **handout** of the OU background was provided. Ecology still needs to assign a lead to this OU. Activities are expected to start in March.

5. 200-CS-1 Chemical Sewer OU – The Nez Perce Tribe has indicated that comments were provided on the work plan. RL is in the process of confirming receipt of these comments. Brenda Becker-Khaleel (Ecology) would like to see the comments and the resolutions. The global issues on residential scenarios is taking longer to resolve than expected, so Brenda Becker-Khaleel (Ecology) advised to proceed with issuing revision 0 of the work plan.

   A **handout** of the radionuclide results of the S Pond characterization activity was provided and reviewed. Geophysical logging and contaminant data will be provided to PNNL for the borehole summary report, as they are the lead on this document. The chemical data should be available by the next Unit Managers' Meeting. Chris Cearlock (CHI) took the action to provide Brenda Becker-Khaleel (Ecology) with a copy of the background (historical) information for radiological results and the quantification data.

   There is a concern about incorporating the 216-B-63 Trench RCRA TSD inspection frequency change into the work plan versus this information being separately provided in a letter. Bruce Ford (BHI) will resolve this issue with Bryan Foley (RL).

6. General Topics – Annual re-evaluation of OU prioritization is in progress. It was announced that regulator participation would be welcome.

   There are two sets of activities at the Hanford prototype surface barrier: 1) housekeeping activities, which are expected to begin in March; and 2) ongoing monitoring activities. Detailed status will be provided at the next Unit Managers' Meeting.

   EPA recommended the Unit Managers' Meetings be held the third Thursday of each month. The next meeting is tentatively scheduled for 3/16. Also, the order will be reversed so groundwater OUs will be discussed first.

7. 200-UP-1 – Status was not provided.

8. 200-ZP-1 – Up and running. Currently looking at algae growth. The well that was running intermittently was fixed.

9. 200-ZP-2 – EPA would like to see the Innovative Treatment Remediation Demonstration (ITRD) completed and to see the recommendations by June. The workshop is scheduled for 3/6-3/7. Issues on the Partitioning Interwell Tracer Test (PITT) will be discussed. **Handouts** were provided on the Duke Engineering cost estimates for the various scenarios and the sub-zone sampling. Discrete packages will be reviewed at the workshop. RL may look at breaking the work into smaller sets of tasks, just to get started. Dennis Faulk (EPA) voiced his preference is to perform all tests, but would accept scenario D, which focuses on below the caliche layer, as a start. The brownbag is scheduled for March 7 to discuss FY00 activities at 200-ZP-2. EPA's alternative is to enforce one Action Memorandum, i.e., that all three vapor extraction systems be up and running. EPA would like to know the minimum activity needed to keep trending data for monitoring and still support a shut down of 200-ZP-2.

A **handout** was provided and reviewed on the monthly monitoring comparisons and the passive soil vapor extraction granular activated carbon analyses. The bomb combustion analytical method could not be used, so this method was ruled out as an option.

Actions:

1. RL to send Doug Sherwood (EPA) a message identifying the critical path of the 200-CW-5 U Pond/Z Ditches Cooling Water work plan and requesting his expedited review. **(Action assigned to Bryan Foley.)**

2. Ecology is to complete the review of the 200-TW-1 and 200-TW-1 Tank Waste OUs materials by 3/2. **(Action assigned to Zelma Jackson.)**

3. Ecology to assign a lead to the 200-PW-2 Uranium-Rich Process Waste OU. **(Action assigned to Wayne Soper.)**

4. Ecology (Brenda Becker-Khaleel) would like to see the comments and resolutions from the Nez Perce Tribe on the 200-CS-2 Chemical Sewer OU work plan. **(Action assigned to Bruce Ford/Chris Cearlock.)**

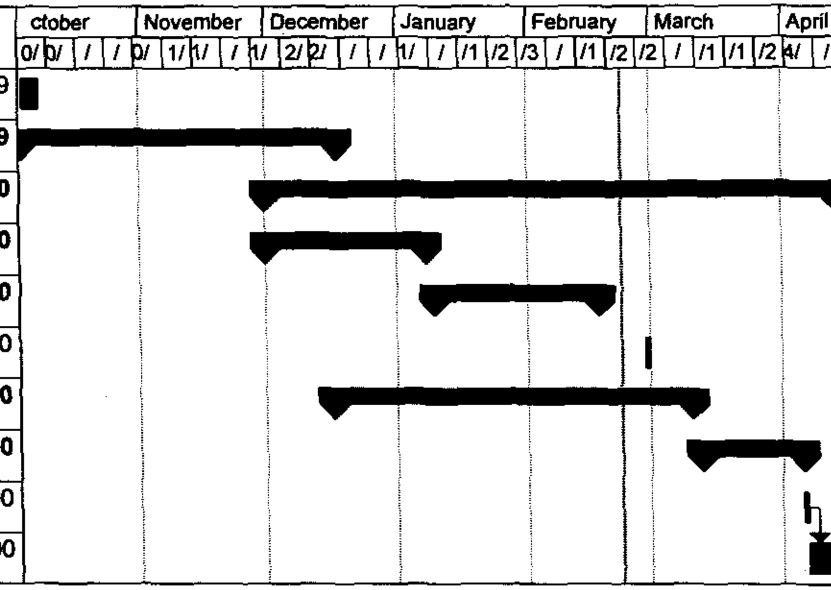
5. Provide Brenda Becker-Khaleel (Ecology) with a copy of the background (historical) information for radiological results and the quantification data on the 200-CS-1 Chemical Sewer OU characterization activities for S Pond. **(Action assigned to Chris Cearlock.)**

6. Resolve the issue with Bryan Foley (RL) about incorporating the 216-B-63 Trench RCRA TSD inspection frequency change into the work plan versus this information being separate and provided in a letter. **(Action assigned to Bruce Ford.)**

7. Detailed status on the Hanford prototype surface barrier activities will be provided at the next Unit Managers' Meeting. **(Action assigned to Curt Wittreich.)**

200-TW-1 & 200-TW-2 DQO Schedule
Preliminary

ID	Task Name	Duration	Start	Finish
1	Prepare Project Plan	4 days	Mon 10/4/99	Thu 10/7/99
2	**Draft Sections 2 & 3**	**55 days**	**Mon 10/4/99**	**Fri 12/17/99**
15	**Complete Waste Group DQOs**	**97 days**	**Wed 12/1/99**	**Thu 4/13/00**
16	**Project scoping**	**28 days**	**Wed 12/1/99**	**Fri 1/7/00**
22	**Interviews and Presentation**	**29 days**	**Mon 1/10/00**	**Thu 2/17/00**
27	Global Issues Meeting (if needed)	1 day	Tue 2/29/00	Tue 2/29/00
28	**Prepare strawman**	**61 days**	**Fri 12/17/99**	**Fri 3/10/00**
36	**Prepare DQO Summary Report**	**18 days**	**Mon 3/13/00**	**Wed 4/5/00**
41	**External DQO meeting**	1 day	Thu 4/6/00	Thu 4/6/00
42	**Prepare Rev. 0 DSR**	5 days	Fri 4/7/00	Thu 4/13/00



Project: detailschedule
Date: Wed 2/23/00

Task		Rolled Up Task		External Tasks	
Progress		Rolled Up Milestone	◇	Project Summary	
Milestone	◆	Rolled Up Progress			
Summary		Split			

082094

Attachment 4

200-PW-2 Uranium-Rich Process Waste Group Operable Unit

The 200-PW-2 Uranium-Rich Process Waste Group Operable Unit is an Ecology-lead operable unit consisting of 24 waste sites, 3 of which are TSDs, and 6 unplanned release sites. Process waste results from the treatment of process liquids to regenerate specific chemicals for reuse in the process. Process waste streams were derived from solvent recovery, ion-exchange regeneration, and ammonia scrubber distillation. The processing was done off-line of a plants major processing system. The waste stream generated from recovery/regeneration is referred to as process waste. Process waste also covers a somewhat different waste stream associated with startup of most separations plants. Charges of unirradiated fuel rods, dissolved and run through the plant to test the process chemistry, produced cold startup wastes. The liquid solutions were then discharged to the ground as a waste. Waste sites used for disposal of cold startup liquids exist at the PUREX Plant, S Plant, Semiworks, and the Uranium Recovery Program (URP). Cold startup wastes were usually contaminated with uranium, whereas process wastes derived from fuel reprocessing tended to have a much more varied and equally concentrated inventory of contaminants. This waste group was established to address those waste sites that received large quantities of total uranium (uranium-238), primarily from waste streams generated from dissolving fuel rods. Up to 38,500 kg of uranium-238 inventory is reported at these sites, but a minimum 150 kg inventory was used as a base value.

The following list identifies the waste sites in the 200-PW-2 OU including the TSDs and the representative sites.

216-A-1 Crib
216-A-3 Crib
216-A-5 Crib
216-A-10 Crib – TSD
216-A-18 Trench
216-A-19 Trench – Representative site
216-A-20 Trench
216-A-28 Crib
216-A-36A Crib
216-A-36B Crib – TSD
216-B-12 Crib – Representative site
216-B-60 Crib
216-C-1 Crib
216-S-1&2 Crib
216-S-7 Crib
216-S-8 Trench
216-U-1&2 Crib
216-U-5 Trench
216-U-6 Trench
216-U-8 Crib – Representative site
216-U-12 Crib – TSD
241-U-361 Settling Tank
270-E-1 Neutralization Tank
270-W Neutralization Tank
UPR-200-E-39
UPR-200-E-40
UPR-200-E-64
UPR-200-W-19
UPR-200-W-36
UPR-200-W-163

Radionuclide Results																
		SAF B99-078			Tritium	Technetium 99	Neptunium 237	Total Uranium	Plutonium 238	Plutonium 239/240	Nickel 63	Americium 241	Total Strontium	Thorium 228	Thorium 230	Thorium 232
				CAS	10028-17-8	14133-76-7	13994-20-2	7440-61-1	13981-16-3	PU-239/240	13981-37-8	14596-10-2	SR-RAD	14274-82-9	14269-63-7	TH-232
Sample Location	Sample Interval	HEIS Number	Sample Date	Units	pCi/g	pCi/g	pCi/g	µg/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g
B8717	35.0-37.0	B0XO99	11/19/99					0.460 J	0.033 U	0.033 U		0.064 U	-0.057 U	0.87		0.536
	(Dup)	B0XOB0	11/19/99					2.14	0.036 U	0.035 U		0.20 U	-0.052 U	0.637		0.829
	(Split)	B0XOX4	11/19/99													
	50.0-52.0	B0XOB1	11/22/99		0.064 U	-0.062 U	0.030 U	1.94	0.026 U	0.015 U	0.758 U	0.12 U	-0.015 U	0.447 U	0.479 J	0.671 J
	(Dup)	B0XOB2	11/22/99		0.040 U	-0.144 U	0.028 U	0.804 J	0 U	0.016 U	2.46 J	0.047 U	1.57	0.445 J	0.662 JB	0.362 J
	99.5-101.5	B0XOB3	11/23/99		0.038 U	-0.132 U	0.013 U	0.772 J	0.005 U	0.117 J	2.14 U	0.074 U	-0.065 U	0.580 J	0.812 J	0.534 J
	135-137	B0XOB4	11/30/99					0.806 J	-0.006 U	0.006 U		0.019 U	-0.068 U	0.623		0.606
	150-152	B0XOB5	12/01/99		-0.046 U	0.118 U	0.004 U	0.589 J	-0.014 U	0.021 U	1.4 U	0.33 U	-0.027 U	0.484 J	0.436 J	0.390 J
	180-182	B0XOB6	12/02/99		-0.001 U	0.114 U	0.008 U	0.782 J	0.004 U	0.012 U	-0.088 U	0.17 U	-0.023 U	0.484 J	0.738 J	0.387 J
	197-199	B0XOB7	12/07/99		0.012 U	-0.049 U	-0.016 U	0.377 J	-0.007 U	0.007 U	1.41 U	0.074 U	-0.133 U	0.516 J	0.243 J	0.531 J

082094

Attachment 6

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Radionuclide Results																	
		SAF B99-078			Potassium 40	Cobalt 60	Cesium 137	Europium 152	Europium 154	Europium 155	Radium 226	Radium 228	Uranium 233/234	Uranium 235	Uranium 238	Gross Alpha	Gross Beta
				CAS	13966-00-2	10198-40-0	10045-97-3	14683-23-9	15585-10-1	14391-16-3	13982-63-3	15262-20-1	U-233/234	15117-96-1	U-238	12587-46-1	12587-47-2
Sample Location	Sample Interval	HEIS Number	Sample Date	Units	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g
B8717	35.0-37.0	B0XO99	11/19/99		13.7	0.12 U	0.084 U	0.18 U	0.29 U	0.11 U	0.589	0.536		0.19 U	11 U	3.93 J	12.8 J
	(Dup)	B0XOB0	11/19/99		12.4	0.071 U	0.062 U	0.16 U	0.24 U	0.16 U	0.396	0.829	0.407 J	0.055 U	0.434 J	7.2 J	14.4 J
	(Split)	B0XOX4	11/19/99														
	50.0-52.0	B0XOB1	11/22/99		12.9	0.059 U	0.047 U	0.12 U	0.17 U	0.12 U	0.428	0.566	0.452 J	0.022 J	0.381 J	5.61 J	19.8
	(Dup)	B0XOB2	11/22/99		12.5	0.048 U	0.043 U	0.11 U	0.15 U	0.089 U	0.362	0.492		0.15 U	5.4 U	7.62 J	21.9
	99.5-101.5	B0XOB3	11/23/99		13.1	0.030 U	0.029 U	0.070 U	0.10 U	0.067 U	0.564	0.907		0.10 U	3.8 U	9.15 J	16.8
	135-137	B0XOB4	11/30/99		9.14	0.092 U	0.075 U	0.20 U	0.26 U	0.19 U	0.533	0.606		0.26 U	8.7 U	10.7	40.3
	150-152	B0XOB5	12/01/99		0.42 U	0.042 U	0.11 U	0.29 U	0.35 U	0.28 U	0.359	0.748				3.02 J	24.0 B
	180-182	B0XOB6	12/02/99		8.51	0.29 U	0.22 U	0.41 U	0.91 U	0.30 U	0.515	1.2 U		0.49 U	27 U	9.03 J	8.18 J
	197-199	B0XOB7	12/07/99		13.9	0.13 U	0.098 U	0.21 U	0.39 U	0.13 U	0.344	0.523		0.21 U	14 U	6.58 J	33.1 B

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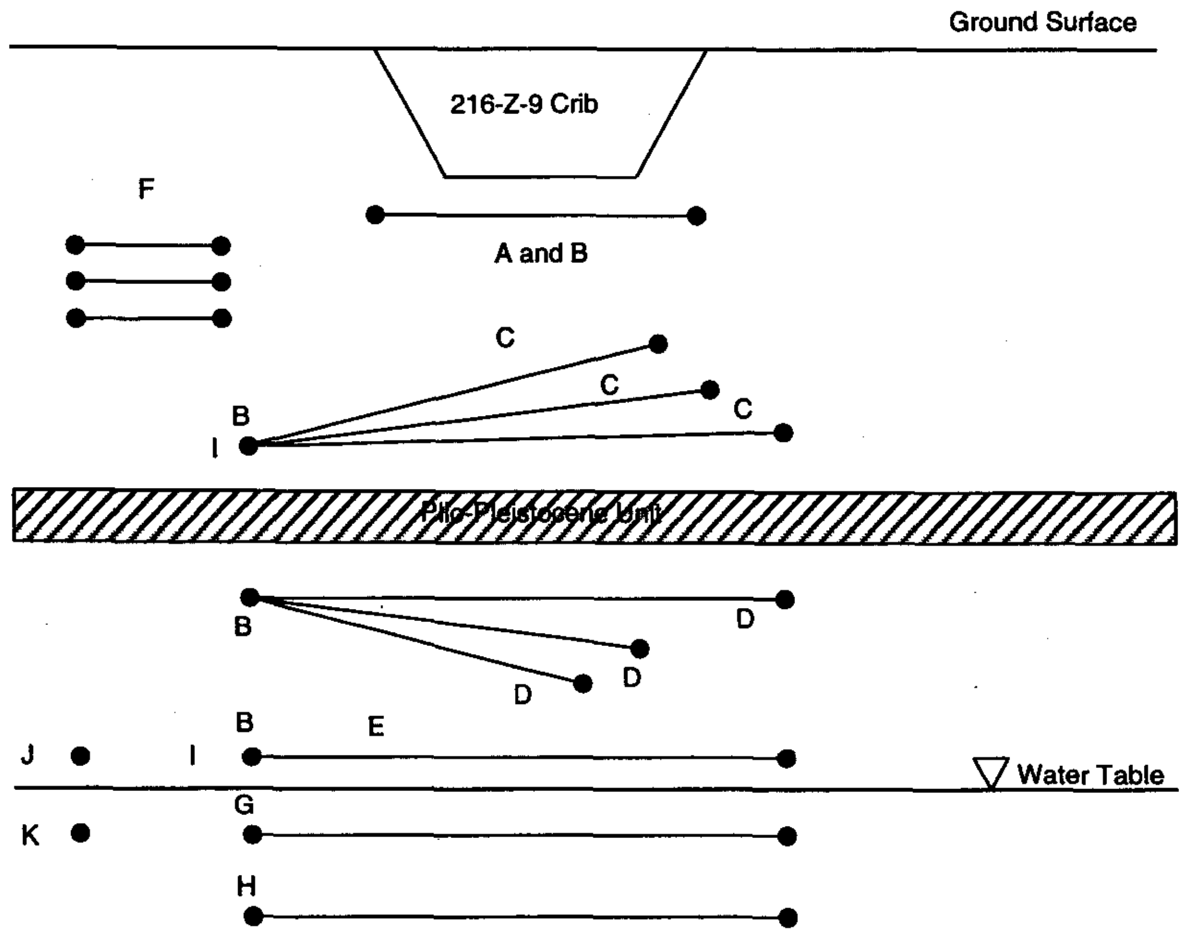
Ground Surface
216-Z-9 Crib
F
A and B
C
C
C
B
I
Plio-Pleistocene Unit
B
D
D
D
B
E
J
I
Water Table
G
K
H

Attachment 7

082094

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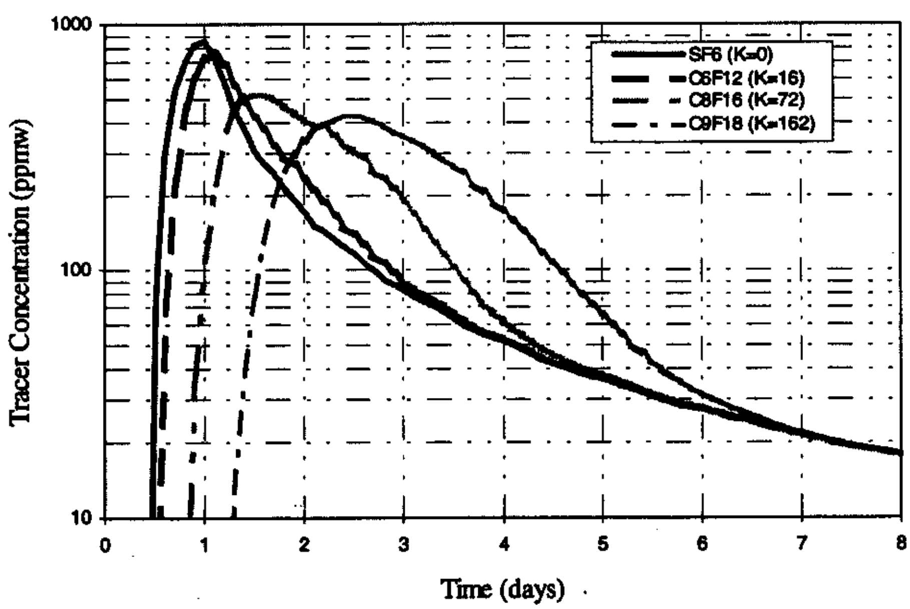
Duke Engineering & Services

Preliminary Cost Estimates for Partitioning Interwell Tracer Tests to Characterize Carbon Tetrachloride DNAPL Beneath Z-9 Crib, Hanford Reservation, Washington

Prepared for the Innovative Treatment Remediation Demonstration Program
January 13, 2000



Introduction

Duke Engineering & Services is providing these preliminary cost estimates to DOE's Innovative Treatment Remediation Demonstration Program to aid in the detection and quantification of carbon tetrachloride DNAPL in the sediments beneath the Z-9 Crib, 200 Area West, Hanford Reservation by partitioning interwell tracer tests[1] (PITTs). The simulations have been prepared using the UTCHEM simulator to model the duration, pore volume, tracer mass required and necessary flow rates for a series of PITT scenarios that ITRD members have identified as providing useful information for remedial design.

The simulations have allowed us to estimate approximate costs for the design, execution and analysis of the PITTs that have been identified for the vadose zone beneath the Z-9 Crib. It has been difficult to estimate costs for the proposed ground-water zone PITTs for reasons that are discussed below. We will undertake the cost estimation of PITTs beneath the water table following further discussions with the ITRD panel. We conclude this document with recommendations for the path forward.

PITT Simulations

The cost estimates for different PITT scenarios as presented in this proposal are based on the conceptual simulation results of the UTCHEM simulator. UTCHEM is a multi-component, multiphase, three-dimensional chemical flood reservoir simulator developed at the University of Texas at Austin. It was originally developed to simulate the surfactant/polymer enhanced oil recovery process (Pope and Nelson, 1978; Datta-Gupta et al., 1986; Saad et al., 1990). In the past nine years, enhancements have been made to adapt UTCHEM to simulate both PITTs and surfactant-enhanced aquifer remediation (SEAR) processes (Delshad et al., 1996). UTCHEM represents the current state of the art for PITT and SEAR design, and has been successfully used by DE&S to design numerous PITTs, surfactant, and surfactant/foam flood field demonstrations (e.g DE&S, 1998, RICE et al, 1997, USAF 1998a-d, 1999). The simulation modeling was used to gain insight into pertinent design parameters that affect the cost estimate for each PITT scenario.

The simulation model developed for the cost estimate studies was based on site hydrostratigraphic data and porous media and fluid physical properties contained in technical reports prepared by Westinghouse Hanford Company (1994) and Bechtel Hanford, Inc (1997). Based on the injection and extraction well pattern specified in each PITT scenario, a non-uniform 35x35x15 model grid was chosen for the modeling studies. The area and thickness of the model dimensions were different for each PITT scenario, although the number of gridblocks was kept constant. However, for all the cases studied, smaller grid sizes were used for the gridblocks around the injection and extraction wells. The simulation dimensions and the number of gridblocks were chosen to minimize boundary effects. The pressure at the outer boundaries of the simulation domain was kept constant at 14.7 psi. It was assumed that the average carbon tetrachloride saturation in the modeled zone is 1%.

A number of sensitivity studies were run to simulate the performance of each PITT scenario under different conditions. These sensitivity studies included varying the injection and extraction rates, injection and extraction well locations, permeability field characteristics, etc.

[1] US Patents 5,905,036 and 6,003,365, assigned to the University of Texas at Austin and Duke Engineering & Services

Each simulation run takes about 10 CPU hours on a DEC alpha AXP machine. The results from these sensitivity studies are used to determine the duration of the tracer test, the mass of each tracer needed, the injection and extraction rates, the extraction well effluent tracer concentrations and the amount of tracer recoverable at the end of tracer test. The UTCHEM simulation results and a discussion of each PITT scenario are presented in *Discussion of PITT Scenarios*. A summary of the simulation results and cost estimates for each PITT scenario are also presented in a table under *Cost Information*.

The major assumption for the simulation studies, however, was the sustainable injection and extraction airflow rates for each well. It was assumed that each well can maintain a sustainable flow rate of 200 cubic feet per minute (cfm) (i.e. 5.7 m^3/min) over an average 60 ft screened interval. For scenarios C and D, it was also assumed that the injection well can maintain a sustainable injection rate up to 600 cfm (17 m^3/min). Should the well not be able to maintain these flow rates, the test duration and cost estimates presented under *Cost Information* must be adjusted accordingly. *

Discussion of PITT Scenarios

Scenario A

Scenario A calls for a vadose-zone PITT at one depth directly beneath the Z-9 Crib. There is a coarse gravel unit (Hanford Upper Coarse) with a thickness of approximately 30 ft directly beneath the Z-9 Crib. Assuming that the airflow generated by the injection and extraction well is confined to this high permeability unit, the PITT proposed for this scenario is possible. For an interwell distance of 140 ft and a well screen interval of 30 ft, the PITT will test a pore volume of approximately 0.26 million cubic feet (ft^3) with an injection and extraction rate of 150 cfm.

Scenario B

Scenario B calls for a series of PITTs at multiple depths above and below the caliche layer. However, considering the high mobility of the air phase and lack of confinement, it is very difficult to isolate the airflow at a specific depth or zone without simultaneous injection of air at all depths. Therefore, the proposed PITTs should be conducted simultaneously rather than sequentially. The average thickness both above and below the caliche layer in the targeted zone is approximately 60 ft. Each zone can, therefore, be divided into three sub-zones. For the PITTs below the caliche layer, for example, the zone can be divided into an upper zone with a thickness of ~ 20 ft (located directly beneath the caliche layer), a lower zone with a thickness of about 20 ft (located just above the water table), and a middle zone with a thickness of about 20 ft (located between the upper and the lower zones). A PITT conducted in this configuration can achieve both the objectives of proposed PITT scenarios D and E. B and E For an interwell distance of 180 ft and a total injection and extraction rate of 200 cfm, the PITT will test a total pore volume of approximately 0.53 million ft^3.

3 20' zones above or below

Scenario C

Scenario C calls for a vadose-zone PITT in three different directions at one depth above the caliche layer. Although this scenario is physically possible to implement, it is however more beneficial economically to modify the PITT scenario described in scenario B. That is, the PITT would be conducted by dividing the entire zone into three different sub-zones (upper, middle and lower). The difference in scenario C compared with scenario B is that there are three different extraction wells. Provided that it would be possible to sustain a flow rate of ~ 500 to 600 ft^3 in the injection well and 200 ft^3 in each extraction well, this scenario is superior to that of scenario B. For an interwell distance between the injection and extraction wells of ~ 180 ft, the proposed PITT will sweep a pore volume of approximately one millon ft^3.

Scenario D
Scenario D calls for a vadose-zone PITT along three different directions at one depth below the caliche layer. As was described in scenarios B and C, this scenario is identical to scenario C for costing purposes.

Scenario E
Scenario E calls for a vadose-zone PITT at the ground-water/vadose-zone interface. As was described in scenario B, scenario E is almost identical to scenario B.

Scenario F
Scenario F calls for a series of vadose-zone PITTs over multiple closely-spaced, short intervals. However, a 10-ft interwell distance would not provide sufficient residence time for the tracers in the subsurfact. For the Hanford site, we believe a minimum interwell distance of 30 to 40 ft is required. For an interwell distance of ~ 40 ft and an average thickness of 45 ft, each single PITT will sweep a pore volume of approximately 33,400 ft^3 with injection and extraction rates of 20 cfm.

Scenario G
Scenario G calls for saturated-zone PITTs with interwell distances of ~ 110 to 240 ft. This scenario would require a line-drive pattern of injection wells, several hydraulic control wells, vast quantities of tracer and the ability to treat hundreds of gallons per minute of effluent rich in alcohols.

Scenario H
Scenario H calls for a saturated-zone PITT with an interwell distance of 237 ft. See Scenario G.

Scenario I
Scenario I is identical to scenarios B and E for costing purposes.

σ ?

K ?

Cost Information

A good faith effort has been made to estimate the costs to implement PITTs beginning with plan development and following through each step to preparing a final report. The costs attached are preliminary estimates, and can not be a firm offer. The estimated costs may very well be reduced significantly depending on facility requirements and support.

The estimated costs for each scenario are presented in the table below. The costs shown opposite the various scenarios are exclusive of "start-up" costs as noted at the bottom of the table. The "start-up" costs estimated should be one time costs required to begin work. Examples of these costs include selecting suitable tracers for the formation and type of contamination and sending field personnel to site-specific training courses. Additional "start-up" costs are those for the assembly and programming of data acquisition systems to monitor and control the tests, costs to procure the hardware required to implement the tests in the field, and the costs to procure and prepare the equipment needed to perform in-line analyses.

As with the preparation of any cost estimate, numerous assumptions must be made. Some of the assumptions made for this cost estimate follow.

- Representative soil material will be provided to DE&S in Austin for tracer selection at no cost in labor or currency
- Equipment set-up, other than on-site laboratories, will be the responsibility of the facility
- Treatment of the off-gas is the responsibility of the facility
- Health & safety oversight, to include monitoring equipment, is provided by the facility
- Existing wells are used for each of the tests

- Electricity, potable water, and compressed air are provided at no cost in labor or currency
- Sanitary facilities are provided at no cost in labor or currency
- All costs are based on FY2000 rates

[illegible]	[illegible]	Pore Volume (million gallons)	Test Duration (days)	Tracer Mass (kg per tracer)	[illegible]	[illegible]
Scenario A	140	0.26	7	10	150	$341,596 [3]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Scenario C [1]	180	1	6	15	200 (ext) 600 (inj)	$770,908 [4]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Scenario E [1]	180	0.53	12	15	200	$807,506 [4]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Scenario G	110 – 240	> 1 million gallons	30	> 500	> 100 gallons/minute	> $2 million
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Scenario I [1]	180	0.53	12	15	200	$807,506

Note:
1. *Scenarios B, C, D, E, and I involve injection and extraction in three subsections of the zone simultaneously. The swept pore volume, flow rate, and tracer mass presented are the total of the three zones.*
2. *See description in Discussion of Scenarios*
3. *An initial start-up cost of $134,930 in addition to the costs presented above will be required*
4. *An additional $169,345 start-up cost beyond that required in Note 3 above will be required*

Path Forward

It is recommended that the ITRD panel convene a meeting in February with DE&S, ARA and the ESRI geophysicists to discuss an appropriate plan of action. One topic of discussion might be the various options developing that would allow tracer testing over very large distances in highly permeable alluvium, thus overcoming our concerns expressed in scenarios G and H.

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200-ZP-2

Passive Soil Vapor Extraction Granular Activated Carbon Analyses

Well No.		Total	Sum of	Carbon		Chloroform		Methylene		Trichloro-		Acetone		Solids	Dry Weight	CCl4 removed
GAC	HEIS	Chloride	VOAs	Tetrachloride				Chloride		ethene					Jan-2000	10/14/99-10/28/99
Sample	Number	(mg/kg)	(mg/kg)	(ug/kg)		(ug/kg)		(ug/kg)		(ug/kg)		(ug/kg)		(%)	(kg)	(g)
W18-10	B0WV17	105	1,321	1,100,000		21,000	J	200,000	B					57.7	0.45	0.86
W18-7	B0WV18	1,630	2,031	1,800,000		55,000	J	160,000	B	16,000	J			76.8	0.45	1.05
W18-247	B0WV19	1,510	1,667	1,500,000		15,000	J	100,000	B			52,000	JB	89.7	0.45	0.75
W18-246	B0WV20	357	1,808	1,600,000		38,000	J	170,000	B					53.0	0.45	1.36
W18-6	B0WV21	8,260	5,003	4,600,000		83,000	J	320,000	B					71.1	0.45	2.91
W18-252	B0WV22	160	2,370	2,200,000				170,000	B					52.1	0.45	1.90
W18-11	B0WV23	1,430	1,725	1,600,000		15,000	J	110,000	B					82.6	0.45	0.87
W18-12																
Clean GAC	B0WV24	1,400	1,320	1,200,000				120,000	B					88.0	0.45	0.61

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Attachment 8

Comparison of Maximum Carbon Tetrachloride Rebound Concentrations Monitored at 200-ZP-2 Soil Vapor Extraction Sites FY 1997 - FY 2000

200-ZP-2 Location (Well or Probe) /feet bgs	Site	Zone	November 1996 - July 1997 Maximum Rebound Carbon Tetrachloride (ppmv)	months* of rebound	October 1997 - September 1998 Maximum Rebound Carbon Tetrachloride (ppmv)	months* of rebound	July 1998 - September 1999 Maximum Rebound Carbon Tetrachloride (ppmv)	months* of rebound	July 1999 - January 2000 Maximum Rebound Carbon Tetrachloride (ppmv)	months* of rebound
79-03/ 5 ft	Z-18	1	0	8	0	3	0	12		
79-06/ 5 ft	Z-1A	1	not measured		not measured		1.4	12		
79-11/ 5 ft	Z-1A	1	0	8	0	6	2.9	12		
86-05/ 5 ft	Z-9	1	not measured		not measured		0	3		
86-05-01/ 5 ft	Z-9	1	not measured		not measured		0	3		
86-06/ 5 ft	Z-9	1	1.3	8	0	9	1.9	6		
87-05/ 5 ft	Z-1A	1	not measured		0	3	1.0	12		
87-09/ 5 ft	Z-1A	1	not measured		1.5	3	2.6	12		
94-02/ 5 ft	Z-9	1	0	8	not measured		1.4	3		
95-11/ 5 ft	Z-9	1	0	8	2.1	9	2.5	6		
95-12/ 5 ft	Z-9	1	1.1	8	1.5	9	1.3	6		
95-14/ 5 ft	Z-9	1	not measured		not measured		0	3		
CPT-13A/ 9 ft	Z-1A	2	not measured		0	6	1.0	12		
CPT-16/ 10 ft	Z-9	2	not measured		0	9	1.5	6		
CPT-17/ 10 ft	Z-9	2	not measured		4.2	9	5.1	6	3.1	7
CPT-18/ 15 ft	Z-9	2	not measured		6.5	9	5.0	6	4.3	7
CPT-31/25 ft	Z-1A	2	not measured		0	6	0	12		
CPT-16/ 25 ft	Z-9	2	not measured		not measured		not measured		0	7
CPT-32/ 25 ft	Z-1A	2	not measured		9.1	6	10	12	3.8	4
CPT-30/ 28 ft	Z-18	2	not measured		not measured		3.2	12	1.4	4
CPT-13A/ 30 ft	Z-1A	2	2.2	8	not measured		not measured		1.6	4
CPT-7A/ 32 ft	Z-1A	2	not measured		2.3	6	5.4	12	2.8	4
CPT-27/ 33 ft	Z-9	2	1.2	8	not measured		not measured		1.2	7
CPT-1A/ 35 ft	Z-18	2	2.0	8	1.4	3	3.0	12	4.1	4
CPT-33/ 40 ft	Z-1A	2	not measured		2.0	3	2.6	12		
CPT-34/ 40 ft	Z-18	2	2.3	8	not measured		1.7	12		
CPT-21A/ 45 ft	Z-9	2	65.6	8	52.7	9	57	3	82	7
W15-220SST/ 52 ft	Z-9	2	2	8	not measured		1.6	3		
CPT-28/ 60 ft	Z-9	2	not measured		1.5	0	3.7	3		
CPT-9A/ 60 ft	Z-9	2	45.5	8	41.1	0	44	3	44	7
CPT-30/ 68 ft	Z-18	2	1.7	8	not measured		3.0	12		
CPT-13A/ 70 ft	Z-1A	2	5.2	8	not measured		5.6	12		
CPT-24/70 ft	Z-9	2	not measured		3.2	9	3.6	3		
W15-219SST/ 70 ft	Z-9	2	14.6	8	not measured		7.6	3		
CPT-31/ 76 ft	Z-1A	2	4.0	8	not measured		4.2	12		
CPT-33/ 80 ft	Z-1A	2	5.8	8	not measured		9.2	12		
W15-82/ 82 ft	Z-9	2	28.9	8	5.5	9	46	6	43	7
W15-95/ 82 ft	Z-9	2	not measured		15.3	9	39	6	15	7
CPT-21A/ 86 ft	Z-9	2	221	8	206	9	148	6	141	7
CPT-34/ 86 ft	Z-18	2	36.3	8	5.9	3	0	12		
W15-218SST/ 86 ft	Z-9	2	not measured		not measured		0	3		
CPT-28/ 87 ft	Z-9	2	280	8	230	9	203	6	181	7
CPT-1A/ 91 ft	Z-18	2	3.9	8	not measured		4.2	12		
CPT-4A/ 91 ft	Z-1A	2	not measured		7.7	3	14	12		
CPT-9A/ 91 ft	Z-9	2	103	8	34.5	9	72	3		
W18-252SST/ 100 ft	Z-1A	2	38.2	8	17.8	3	24	12		
W18-152/ 113 ft	Z-12	2	46.8	8	11.1	3	33	12	25	4
W15-217/ 115 ft	Z-9	3	797	8	630	9	561	6	400	7
CPT-24/ 118 ft	Z-9	3	44.6	8	37.7	9	37	6		
W15-220SST/ 118 ft	Z-9	4	21.9	8	not measured		36	3		
W18-158L/ 123 ft	Z-1A	3	not measured		143	3	492	12	134	4
W18-167/ 123 ft	Z-1A	3	323	8	79.7	3	228	12	144	4
W15-219SST/ 130 ft	Z-9	4	298	8	not measured		47	3		
W18-249/ 134 ft	Z-18	3	206	8	20.4	3	215	12	173	4
W18-248/ 136 ft	Z-1A	3	288	8	86.3	3	177	12	130	4
W15-219SST/ 155 ft	Z-9	5	59.6	8	not measured		24	3		
W15-220SST/ 185 ft	Z-9	5	14.5	8	not measured		13	3		
W15-6L/ 189 ft	Z-9	6	22.6	8	17.8	9	1.3	6		
W15-9L/ 189 ft	Z-9	6	18.3	8	15.0	9	15	6	14	7
W18-7/ 200 ft	Z-1A	6	28.5	8	17.3	3	29	12		
W18-6L/ 208 ft	Z-1A	6	36	8	31.3	6	15	12		
W18-12/ 210 ft	Z-18	6	not measured		3.8	3	19	12		

* - based on location (Z-1A/18/12 or Z-9) of monitoring point; specific points may be beyond SVE zone of influence during particular operating configurations
- Z-18 and Z-12 wells off-line Oct 96 - Apr 98
- CPT-1A, CPT-9A, and possibly CPT-7A appeared to be beyond SVE zone of influence in Oct 96 based on differential pressure (BHI-01105, p. 6-1)
- CPT-9A, CPT-21A, CPT-28 beyond SVE zone of influence in May 96 based on CCl4 concentrations and airflow modeling based on measured vacuums (BHI-01105, p. 6-1)

Carbon Tetrachloride Rebound Concentrations Monitored at 200-ZP-2 Soil Vapor Extraction Sites July 1999 - January 2000

200-ZP-2 Location (Well or Probe) /feet bgs	Site	Zone	07/30/99 CCl4 (ppmv)	09/14/99 CCl4 (ppmv)	9/28/99 CCl4 (ppmv)	10/26/99 CCl4 (ppmv)	11/30/99 CCl4 (ppmv)	12/29/99 CCl4 (ppmv)	01/25/2000 CCl4 (ppmv)
CPT-17/ 10 ft	Z-9	2	2.1	2.6	2.3	1.7	3.1	2.6	2.9
CPT-18/ 15 ft	Z-9	2	1.3	3.5	0	1.8	1.6	4.3	2.8
CPT-16/ 25 ft	Z-9	2				0	0	0	0
CPT-32/ 25 ft	Z-1A	2				0	0	1.5	3.8
CPT-30/ 28 ft	Z-1A	2				0	1.0	1.4	0
CPT-13A/ 30 ft	Z-1A	2				0	0	1.6	1.1
CPT-7A/ 32 ft	Z-1A	2				2.3	1.9	2.8	2.3
CPT-27/ 33 ft	Z-9	2				1.1	0	1.2	1.2
CPT-1A/ 35 ft	Z-12	2				2.5	3.1	2.8	4.1
CPT-21A/ 45 ft	Z-9	2	51.7	56.6	42	50.3	78	70.4	81.6
CPT-9A/ 60 ft	Z-9	2	----- (a)	43.9	44.0	32.9	39.3	43.5	38.1
W15-82/ 82 ft	Z-9	2	----- (a)	42.5	38.1	35.7	23.4	21.2	19.0
W15-95/ 82 ft	Z-9	2	----- (a)	8.3	7.6	9.0	11.2	12.0	14.5
CPT-21A/ 86 ft	Z-9	2	66.6	12.6	123	90.7	133	123	141
CPT-28/ 87 ft	Z-9	2	49.3	151	105	104	170	180	181
W18-152/ 113 ft	Z-12	2				1.8	22.1	24.7	17.7
W15-217/ 115 ft	Z-9	3	68.6	267	26.3	204	317	370	400
W18-158L/ 123 ft	Z-1A	3				79.6	103	134	132
W18-167/ 123 ft	Z-1A	3				88.8	115	144	109
W18-249/ 134 ft	Z-18	3				74.8	132	173	149
W18-248/ 136 ft	Z-1A	3				130	96.7	85.5	110
W15-9L/ 189 ft	Z-9	6	----- (a)	10.3	1.1	8.6	12.0	12.1	14.4
(a) sample pump failure									

Listed Waste – F003 (Methanol)

Background

- A small amount of resin and groundwater contained in a resin pump used at the N Springs Pump and Treat system were inadvertently discharged to the 100-HR-3 Treatment System.
- The resins from the N Springs Pump and Treat System are currently being designated as state-only F003 listed waste because of an assumption that listed waste was discharged to the 1325-N and 1301-N Liquid Waste Disposal Facilities and subsequently to the groundwater.
- The Form 3s of the Dangerous Waste Permit Applications for the 1325-N and 1301-N Liquid Waste Disposal Facilities (LWDFs) includes the F003 listed waste code based upon assumed discharges of spent methanol.

Issue

- Continued designation of N Area Pump and Treat wastes (resins, PPE, etc), extracted and injected ground water, and spills as F003 listed waste.

Recommendation

- The F003 code should not be applied to the N Area ground water, resins, equipment, PPE, or other media that comes into contact with N Area ground water because they do not contain methanol.

Rationale

- Based on information contained in the Part A Form 3s, the discharge concentration of methanol is estimated to be 0.47 ppm.
  - Maximum methanol discharge of 6,200 lbs/yr
  - Stream flow rate of 4,320,000 gal/day
  - (4,320,000 gal/day) x (8.34 lbs/gal) x (365 day/yr) = $1.315\text{x}10^{+10}$ lbs/yr
  - (6,200 lbs/yr) ÷ ($1.315 \times 10^{+}10$ lbs/yr) = 4.71×10^{-7} lbs methanol/lb water = 0.47 ppm
- This concentration would be further reduced during infiltration into the ground. Assuming a 100 to 1 dilution (as used in the soil remediation projects), the concentration would be below 0.0047 ppm. This concentration would be even further reduced once the material was introduced into the 100-HR-3 pump and treat system.
- Two samples were obtained and analyzed for methanol from the N Springs P&T Project, one from a drum containing well drilling slurries and one of the influent sample port. Methanol was not detected (5 ppm undetected). A groundwater sample was also taken from well 199-N-3. Methanol was not detected in this sample (0.93 ppm undetected).

Note

- N Springs waste is designated as state-only F003. It is not considered a listed waste under the federal regulations. Under the federal regulations, the F003 designation is applied solely on the characteristic of ignitability. Under 40 CFR 261.3(a)(2)(iii) a waste listed solely due to a hazardous waste characteristic is no longer a listed waste if mixed with another waste such that the resultant mixture no longer exhibits the characteristic. The methanol, upon mixing with water after discharge would no longer be ignitable and hence does not carry the federal F003 code.

Approval

Wayne Soper 1-28-00

W. W. Soper, Cleanup Project Manager
Washington State Department of Ecology

Listed Waste – F003 (Methanol)

Background

- A small amount of resin and groundwater contained in a resin pump used at the N Springs Pump and Treat system were inadvertently discharged to the 100-HR-3 Treatment System.
- The resins from the N Springs Pump and Treat System are currently being designated as state-only F003 listed waste because of an assumption that listed waste was discharged to the 1325-N and 1301-N Liquid Waste Disposal Facilities and subsequently to the groundwater.
- The Form 3s of the Dangerous Waste Permit Applications for the 1325-N and 1301-N Liquid Waste Disposal Facilities (LWDFs) includes the F003 listed waste code based upon assumed discharges of spent methanol.

Issue

- Does the F003 listed waste code now apply to the 100-HR-3 Pump and Treat wastes (resins, PPE, etc), re-injected fluids, aquifer (if it is extracted), etc.

Recommendation

- The F003 code should not be applied to the 100-HR-3 Pump and Treat project because the groundwater and resins do not contain spent methanol.

Rationale

- Based on information contained in the Part A Form 3s, the discharge concentration of methanol is estimated to be 0.47 ppm.
  - Maximum methanol discharge of 6,200 lbs/yr
  - Stream flow rate of 4,320,000 gal/day
  - (4,320,000 gal/day) x (8.34 lbs/gal) x (365 day/yr) = $1.315 \times 10^{+10}$ lbs/yr
  - (6,200 lbs/yr) ÷ ($1.315 \times 10^{+}10$ lbs/yr) = 4.71×10^{-7} lbs methanol/lb water = 0.47 ppm
- This concentration would be further reduced during infiltration into the ground. Assuming a 100 to 1 dilution (as used in the soil remediation projects), the concentration would be below 0.0047 ppm. This concentration would be even further reduced once the material was introduced into the 100-HR-3 pump and treat system.
- Two samples were obtained and analyzed for methanol from the N Springs P&T Project, one from a drum containing well drilling slurries and one of the influent sample port. Methanol was not detected (5 ppm undetected). A groundwater sample was also taken from well 199-N-3. Methanol was not detected in this sample (0.93 ppm undetected).

Note

- N Springs waste is designated as state-only F003. It is not considered a listed waste under the federal regulations. Under the federal regulations, the F003 designation is applied solely on the characteristic of ignitability. Under 40 CFR 261.3(a)(2)(iii) a waste listed solely due to a hazardous waste characteristic is no longer a listed waste if mixed with another waste such that the resultant mixture no longer exhibits the characteristic. The methanol, upon mixing with water after discharge would no longer be ignitable and hence does not carry the federal F003 code.

Approval

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W. W. Soper, Cleanup Project Manager
Washington State Department of Ecology

082094

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